The widened air inlet was found to be effective for reducing the air speed at the inlet resulting in an undisturbed Kelvin Helmholtz interface and consequent optimal water-air mixing.

According to a first aspect of the present application, there is provided a method for reducing marine growth on a vessel, comprising providing an air lubrication system and covering at least a part of the hull with air bubbles.

According to a second aspect of the present application, there is provided an use of an air lubrication system on a vessel for the reduction of marine growth on the hull of the vessel.

According to a third aspect of the present application, there is provided a system for providing an air lubricating layer between a hull of a vessel and water flowing along the hull as the vessel is moving through the water, which system comprises sidewalls and a top wall defining a cavity with an opening situated in an interface plane that is transversely to the sidewalls, substantially at the level of the hull, the opening having a front end and a rear end when seen in the length direction of the cavity, an air inlet spaced from the opening of the cavity, at least one water deflector being provided in the cavity, the deflector extending substantially across the width (W) of the cavity and being releasably connected across the cavity.

According to a fourth aspect of the present application, there is provided a vessel comprising a system for providing an air lubricating layer between the hull of a vessel and water flowing along the hull as the vessel is moving through the water, which system comprises sidewalls and a top wall defining a cavity with an opening situated in an interface plane that is transversely to the sidewalls, substantially at the level of the hull, the opening having a front end and a rear end when seen in the length direction of the cavity, a compressor being connected to the cavity, a compressor being connected to the cavity for supplying air into the cavity via an air outlet duct, the vessel comprising a flushing fluid duct and a flushing fluid source connected to said duct which is flushing duct in operation is connected to the air outlet duct.

According to a fifth aspect of the present application, there is provided a vessel comprising a system for providing an air lubricating layer between a substantially flat bottom of the hull of a vessel and water flowing under the bottom as the vessel is moving through the water, which system comprises sidewalls and a top wall defining a cavity with an opening situated in an interface plane that is transversely to the sidewalls, substantially at the level of the flat bottom, the opening having a front end and a rear end when seen in the length direction of the cavity, a compressor being connected to the cavity for supplying air into the cavity via an air outlet duct, wherein a closable valve is comprised in the outlet duct between the cavity and the compressor.

According to a sixth aspect of the present application, there is provided a vessel comprising a hull having a center line, opposing sides and a substantially flat bottom, the vessel having a number of air lubricating systems, each system comprising sidewalls and a top wall defining a cavity with an opening situated in an interface plane that is transversely to the sidewalls, substantially at the level of the flat bottom, the opening having a front end and a rear end seen in the length direction of the cavity, an air inlet spaced from the opening of the cavity, the cavity having a length (Lc), a distance of the top wall from the interface plane (Hc) and a width (W), wherein the ratio Lc/Hc is in the range of 7:1 to 13:1, the ratio W/H is in the range of 1.3:1 to 2.5:1 and the ratio Lc/W is in the range of 3.5 to 1 to 7:1, characterized in that the vessel accommodates for each cavity or pair of cavities on opposite sides of the center line at a predetermined length position, a corresponding compressor for injecting air into the cavity at a pressure substantially corresponding to the hydrostatic pressure in each cavity.

According to a seventh aspect of the present application, there is provided a system for providing an air lubricating layer between a substantially flat bottom of the hull of a vessel and water flowing under the bottom as the vessel is moving through the water, which system comprises sidewalls and a top wall defining a cavity with an opening situated in an interface plane that is transversely to the sidewalls, substantially at the level of the flat bottom, the opening having a front end and a rear end seen in the length direction of the cavity, an air inlet spaced from the opening of the cavity, the cavity

having a length (Lc), a distance of the top wall from the interface plane (Hc) and a width (W), wherein the ratio Lc/Hc is in the range of 7:1 to 13:1, the ratio W/H is in the range of 1.3:1 to 2.5:1 and the ratio Lc/W is in the range of 3.5 to 1 to 7:1, characterized in that an air inlet opening is provided in the top wall.

According to a eighth aspect of the present application, there is provided a vessel according to any of the vessels as described above comprising a system according to any of the systems as described above.

Brief description of the drawings

Some embodiments of an air lubrication system according to the invention and a vessel comprising such a system will, by way of non-limiting example, be described in detail with reference to the accompanying drawings. In the drawings:

Fig. 1 shows a schematic side view of a vessel comprising an air lubrication system according to the invention,

Fig. 2 shows a perspective view of an air lubrication system according to the invention,

Fig. 3a shows a cross-sectional view of the system of fig. 2,

Figs, 3b and 3c show an enlarged detail of different embodiments of a releaseable fastening member for the deflectos,

Fig 4 shows a schematic side view of a cavity with an elongate deflector according to the invention,

Figs. 5a-5c show different embodiments of a deflector according to the invention,

Fig. 6 shows a partly cut-away view of a vessel comprising for each cavity a respective compressor situated on a support deck near the bow,

Fig. 7 shows a number of cavities near the bow in a V-shaped configuration, and

Fig. 8 shows an embodiment of a bullet-shaped cavity with a rounded front part.

Detailed description of the invention

Figure 1 shows a vessel 1 having a length Lv of between 20 m and 500 m, and a width between 5 m and 75 m. The vessel 1 may have a water displacement of at least 10000 ton, preferably at least 50000 ton and is an ocean going vessel. The vessel 1 has a hull 4

with a bow 2, a stern 3, sides 5 a substantially flat bottom 6 and a propeller 10. Air lubricating cavities 7,8 that are open in the plane of the bottom 6, are distributed along the bottom 6 to generate a layer of bubbles 9 travelling towards the stern 3, along the flat bottom 6. Compressors 11,12 are connected to each cavity 7,8 for supplying air at the hydrostatic pressure inside each cavity at the prevailing draught level of the vessel.